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REVIEWS

Grundriss der Statistik, by Franz Zizek. Munich and Leipsic: Duncker and Humblot. 1921. viii, 470 pp.

Statistics as an academic discipline probably owes more to Germany than to any other country. The word, in the scholar's lingua franca of medieval Latin and later in the vulgar tongues when scholars condescended to employ them, though probably originating in Italy, was German in its early currency. For almost two hundred years, from the day of the Elzevir Republics until early in the nineteenth century, statistics held in German universities a position of honor and importance to which elsewhere it hardly attained. One of the two dominant currents of development throughout that period was so centered in the universities that it has been called German university statistics, a kind of descriptive political science exemplified by what the *Statesman's Year-Book* would be if stripped of its numerical or statistical statements.

During the following century, although the German conception of statistics changed into a closer resemblance to English political arithmetic, yet its hold on the German universities seems to have been little affected thereby. Naturally enough, although the content of statistical textbooks has changed, the literary output in Germany has continued unabated. Probably in the last generation it has equalled that of any two or three other countries. The present work challenges comparison with its predecessors and contemporaries in Germany, and its contemporaries (there are few predecessors) in other countries.

The most spacious survey of statistics ever conceived and carried well toward completion (I exclude Sinclair's *Statistical Account of Scotland*, as I do many sets of census volumes) is doubtless von Mayr's *Statistics and Social Science*, originally planned for two volumes but already filling three, although it has not yet touched the wide field of economic statistics. These three volumes, which have required more than a quarter of a century for their production, occupy nearly two thousand octavo pages. Other and briefer German surveys of this field are found in the fourth part of Conrad's *Outlines of Political Economy*, in Bleicher's *Statistics*, and in Schnapper-Arndt's *Social Statistics*. For England there is Giffen's *Statistics*; for the United States, Mayo-Smith's two volumes. These are the works with which the present publication naturally invites comparison. Other books like those of Newsholme, Bowley, Yule, King and Secrist represent a different view of statistics or are restricted to a relatively narrow field.

Professor Zizek has two objects in mind, one scientific, the other practical. The scientific object is to tie the theory more closely to the practice than previous writers have done. They have treated each branch of statistics by itself with little relation to coördinate branches or to the main trunk of theory; he writes both to prove and to illustrate the interrelations between one branch and another, and the dependence of any one branch upon certain general principles common to all. His practical object is to supply German students of the social sciences

with a brief and clear summary of statistical method, and of the main results secured by using this method in the study of mankind, particularly Germankind.

The book, accordingly, is in two parts: first, the theory and technique of statistics, or the general theory of statistical methods; and, second, material statistics, or the special theory of particular methods and a presentation in systematic fashion of the study's main results.

His general point of view appears in his discussion of mathematics and statistics. The preface states that his book, though touching on the fundamental principles of mathematical statistics, does not cover that field, which presupposes a knowledge of advanced mathematics not usually possessed by students of social sciences for whom he writes. In the body of the work he speaks of mathematical statistics as a special development within the field of statistical methods, applying the calculus of probabilities and the theory of errors. It is often contrasted with elementary statistics which uses only the simplest forms of computation. But such a contrast is one of technique, not of substance. The fundamental principles of mathematical statistics, such as the law of large numbers and the distinction between general causes and accidental disturbing causes, lie at the root also of elementary statistics. Both investigate the uniformities of statistical series, the distribution of single cases around an average, and the degree of correlation between several series. Mathematical statistics with its more refined methods can handle such problems with the greater precision. But the results of elementary statistics usually suffice for the investigations of sociology and economics, and in many such fields there is no need of going further: indeed, the conditions for resorting to mathematical statistics may be lacking. For these reasons the importance of mathematical statistics in the general field of statistical methods is theoretical rather than practical.

He ends the first part of the book with an answer to the question, Is the statistical method a species of induction? Eulenberg says yes; Tschuprow gives it an independent position coördinate with induction; Reichesberg, whom Zizek follows, maintains that induction infers the presence of a characteristic in all members of a group from its observed presence in many members, and thus generalizes. He also maintains that statistics refuses to make a similar assumption, asserting that by its principles no generalization from many members to the group is warranted and every member must be observed. The statistical method thus applies where it is inadmissible to infer inductively from the separate case to the whole group, or deductively from the whole group to the separate case. Reichesberg rightly maintains that the essential characteristic of the statistical method is the elimination of the unimportant, secondary, or individual causes through invoking the law of large numbers under which they will cancel.

To illustrate his handling of a specific statistical problem, I have chosen Professor Zizek's discussion of unemployment, the burden of which is so great as to call for statistical measurement. The condition of the labor market, the progress of an economic cycle, the amount of overpopulation, or the need for planning relief measures may be inferred from the number of the unemployed. This group should be analyzed by various characteristics such as sex and age, and by the duration of unemployment. The methods used in measuring unemployment are:

1. A census of the unemployed taken in connection with a census of population or of occupations. This has the advantage of completeness but the disadvantage of occurring only at long intervals and then perhaps at an unsatisfactory time.

2. A separate census of the unemployed taken at a period of depression or when means to care for unemployment are being considered.

3. Returns from trade unions giving the number of their members out of work or receiving out-of-work relief. The best measure of unemployment obtained from this source is the proportion of members out of work to all members. But unemployment depends upon the time one is out of work, and the best theoretical measure is the ratio between the number of idle days and the number of member days or possible labor days.

4. Those receiving public out-of-work relief are enumerated and the number reported. A distinction is drawn between those entirely out of work and those working on part time. The amount paid in relief and the cost of service are also given.

5. Employment agencies report the number of persons registering as in need of work. But the same person may register at several places, or when he registers may be at work of an unsatisfactory kind. On the other hand, when unemployment is greatest people may become hopeless and fail to register.

6. Statistics of paupers and of tramps throw some light upon the amount of unemployment.

7. Some cities maintain relief work for the unemployed and publish statistical information about them.

Professor Zizek's new book no doubt will prove of great value to German students of statistics. The first part dealing with the theory has a value less limited by lines of nationality. This part of the book might advantageously be translated and published for American students; or, better yet, a book might be prepared based upon this but substituting American material for the prevailing German data.

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Waste in Industry, the Report of the Committee on Elimination of Waste in Industry. New York: McGraw-Hill Book Company. 1921. xii, 409 pp.

The Federated American Engineering Societies came into being toward the end of 1920. One of the first acts of the president, Herbert Hoover, was to recommend a study into the restrictions and wastes in industry. Such a study was authorized by the executive board, and in January, 1921, fifteen engineers (whose principal interest was management engineering) were appointed as the Committee on Elimination of Waste in Industry. Two additional members were appointed later.

It was decided that the study should be in the nature of an assay or reconnaissance, carefully planned and rapidly executed. Both the findings and the method of investigation should be appraised in the light of this decision. In less